



Douglas-Fir Needlecast Management

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Douglas-firs grow quickly to become stately landscape trees, and they're even resistant to deer browsing. They have also been an important part of northeastern Christmas tree and nursery industries. However, recently they have fallen out of favor due to widespread and persistent problems with needlecast diseases which lead to needle discoloration and sparse foliage. Whether in the landscape, nursery or at Christmas tree farms, trees not treated with fungicides will suffer to varying degrees. The needlecast problem and the necessity to spray has become such an issue now that the number of new plantings of Douglas-fir has significantly declined.

The two needlecast diseases responsible for the problems are Rhabdocline (*Rhabdocline weirii*) and Swiss needlecast (*Phaeocryptopus gaumannii*). For many years, the main fungus of concern was Rhabdocline. However, over the last 10 years or so there's been a switch; now Rhabdocline is a rare find and Swiss needlecast predominates.



Rhabdocline causes purplish-brown bands on Douglas-fir needles. Inset: Fruiting bodies of *Rhabdocline* rupture the needle epidermis. Photos © D. D. O'Brien

Swiss Needlecast

Swiss needlecast is a disease that has been known to occur on natural stands of Douglas-fir in native territories in western North America for as long as forest tree problems have been recorded. However, it was a severe outbreak of the disease in the 1920s on a stand of Douglas-fir established in Switzerland that is responsible for the common name.



Fruiting bodies of Swiss needlecast appear as small black dots © K. Loeffler. Inset: Close-up view of fruiting bodies © D.D. O'Brien

In order to manage this disease, trees are treated with fungicides in the spring as the new foliage is emerging and at regular intervals thereafter with some growers in the Northeast treating up to five times in a single growing season. Based on studies done in the Pacific Northwest where single treatments were successful, we wanted to see if Douglas-fir could be successfully grown here with fewer sprays.

Research Study

Over the last three years, we have been looking for ways to optimize the applications and reduce the numbers of treatments necessary. In all of our studies, each tree was treated as an experimental unit with the different treatments applied to separate tagged branches around the tree. We were able to get very good coverage of individual branches with the wand of a handheld sprayer. Treated branches were clipped in early May the following year when the fungal fruiting bodies were clearly visible. They were then rated for disease severity in the lab via microscopic examination.

In the 2015 growing season, we wanted to see if there was an improvement in disease control as the number of sprays increased. We used the standard chlorothalonil product that growers report having success with, Bravo Weatherstik®. We began the study with an early spray when most of the buds just opened up and the average length of new shoots was about ½ inch. We followed with our first regular treatment when all buds were opened and the average shoot length was about one inch. We continued with weekly sprays that resulted in some treatments receiving a total of three sprays.

We rated the results of these treatments and found that the portions of the tree that received the early treatments had a reduction in infection of about 50% over the untreated control. We were not able to find fruiting bodies where a single application was made and not surprisingly for the treatments that had two or three sprays. **So in that situation, with very good spray coverage, only a single spray application was necessary to have complete control.**

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This could be helpful to Christmas tree growers where a single application can range from \$50 to \$80 per acre, especially because by reducing coverage by just one spray a year in the eight years it takes to bring an acre to harvest (assuming spraying begins in the third year) a grower may save in excess of \$250 per acre.

How critical is the treatment timing?

We know that growers and landscape managers aren't always able to spray at the optimal time so we wanted to see how much difference timing made in the efficacy of applications. In 2016, we again made the aforementioned early treatment just after bud break, and treatments were continued weekly **either** at the one inch mark or at the two or three inch marks. (In this study the weekly schedule just happened to coincide with incremental growth length of an inch per week) We are still in the process of analyzing the 2016 data that was collected in May of this year but it appears that timing is not as critical as we anticipated. We found even those shoots that were

treated **only once** either at the one inch, two inch or three inch mark all resulted in excellent control. However, those treated before the one inch mark incurred unacceptable levels of disease with only partial control.

Important principals seem to be emerging

► Spraying before the buds are fully opened and shoots are elongated to at least an inch is not effective.

► After the shoots are at least an inch long, there seems to be at least a three week window to make an application. Although the timing may not be critical thorough coverage is important to protect whatever needles are there.

In 2017 we continued with confirmation of the chlorothalonil timing applications in western NY and on Long Island and also are comparing the effectiveness of four other fungicides, including some systemic materials. We'll know how effective those treatments were in the spring of 2018. Stay tuned!



Each tree was treated as an experimental unit with the different treatments applied to separate tagged branches around the tree © Brian Eshenaur